

Placer County Native Tree Mitigation Policy Report

September 2004

PROBLEM STATEMENT

Due to its unique geography, Placer County contains a wide variety of habitats dominated by woodlands. These woodland habitats include the valley oaks of the Central Valley, the riparian areas along the stream and river corridors, through the broad band of blue oak woodland habitat in the Sierra Nevada foothills, to the montane hardwoods and mixed conifers of the Sierra Nevada range (**Figure 1**). The unincorporated area contains the majority of the woodland habitat in Placer County. The majority of the unincorporated areas containing woodland habitat is in private ownership.

Land use designations associated with woodland resources range from agricultural to rural residential to urban in character. Each of these land use types brings its own land management and land development activities that have the potential to detrimentally impact woodland resources. The County has long sought to address the impacts of development through implementation of a range of mitigation requirements under the California Environmental Quality Act (CEQA) and the County's Tree Preservation Ordinance. The manner in which these mitigation measures have been implemented has varied widely project-by-project and area-by-area.

PURPOSE

The purpose of this policy is to provide a consistent mitigation standard for impacts to the variety of native trees and woodland habitats in the County. The standard is to apply to all discretionary projects including: 1) projects subject to an environmental assessment under the CEQA and 2) projects subject to the Placer County Tree Ordinance.

This policy is intended to mitigate the impact of the loss of woodland communities, not just the trees contained within those communities. As such the measurement of impact is not solely based upon the loss of inches of woody material (typically measured as the diameter at breast height or dbh) although this will be a key determinant to define the scope and scale of the mitigation obligation. The mitigation standard takes into consideration other trees and plants associated with the woodland-dominated natural communities and the value these communities provide to wildlife, air quality, water quality, and quality of life.

EXISTING POLICIES AND PROGRAMS

The County has recognized the value of native trees over the years through the adoption of both policy language and ordinances. The 1994 *General Plan Policy Document* and numerous community plans contain policy language, which is explicitly written to protect woodland habitat. (**Appendix A** contains a summary of all General Plan and community plan policy related to

woodland resources.) In October 1991, Placer County adopted a tree ordinance (Chapter 12, Article 12.16 PCC).

County staff has applied a range of conditions for mitigation on individual projects' impacts on woodlands. These conditions generally represent the nexus between a project's impacts and the degree to which these impacts must be mitigated for a project to meet its CEQA obligations, Tree Ordinance requirements, and to be consistent with General Plan policy.

In addition to the current sample conditions the staff has also applied other standards generally derived from the negotiation on individual projects. These standards are typically developed as mitigation measures during environmental review for tree losses. They have been applied to other woodland resources, but more often than not the focus has been on individual trees.

The most often-used mitigation requirement is one of the following:

1. One fifteen gallon tree for each tree removed
2. Three five-gallon trees for each tree removed
3. Five one-gallon trees for each tree removed
4. Fifteen seedlings for each tree removed
5. Payment of \$100/tree removed or the cost equivalent to the replacement of one fifteen-gallon tree. Payments are made to the County's tree mitigation fund.

The above range of standards has, for the most part, focused on individual tree replacement and has not taken into account tree size, age, species type, and relationship to other ecological factors. This mitigation method does not replace the function of the plant community disturbed.

In the past, the range of mitigation requirements, in terms of in-lieu fees, has been from \$1.50 to \$100 per inch measured at the diameter at breast height (dbh). In-lieu-fees are directed to the County's tree mitigation fund. To date the County has collected approximately \$875,000 in the tree mitigation fund from over 100 projects. The money collected in the fund has been used to plant trees at Colonial Village, the Traylor Ranch Nature Reserve, along Highway 49, at the Eureka Union School District trail, at the Meadow Vista Park, and along Nevada Street. The remaining funds are available for additional similar projects that preserve or replant woodlands.

WOODLAND RESOURCES CLASSIFICATION

The classification system of woodland resources in Placer County identified in this policy is based upon the Wildlife Habitat Relationship (WHR) system used by the California Department of Fish and Game (DFG). In Placer County, the WHR system identifies a total of 36 different natural communities (see **Appendix B**). Statewide, WHR identifies 52 different natural communities. Therefore, as a single county we possess 69% of all natural communities in the state. Of this total, trees dominate 19 of the natural communities. For purposes of this set of standards, these 19 habitat types have been simplified into 9 categories. Several WHR classes have been combined to develop useful policy standards across the County's landscape without having to fully delineate the landscape of a given project.

The 9 habitat types covered by this policy are as follows: Valley oak woodland, valley foothill riparian, blue oak woodland, montane hardwood, montane riparian, Sierra Nevada montane forest, Sierra Nevada upper montane forest, Sierra Nevada subalpine forest and Sierra Nevada juniper-pine woodland (**Figure 1**).

The management techniques and conservation objectives for woodland communities found in the western portion of the County differ vastly from those in east Placer County. As such, the mitigation objectives and standards are unique for each woodland type. A description of the nine woodland types located in west Placer County is provided below. **Appendix C** contains photographs of dominant trees found in these nine woodland types. These photos are intended to help identify which type of woodland community is associated with a given property or region and provide general assistance to property owners, decision-makers, the public, and County staff.

The following information on woodlands was summarized from *A Guide to Wildlife Habitats of California* (Mayer and Laudenslayer, 1988).

1. Valley Oak Woodland

This natural community is dominated by valley oaks (*Quercus lobata*) and varies from savanna-like to forest-like stands with partially closed canopies. (WHR type – Valley Oak Woodland)

Vegetation Composition and Structure

These widely scattered but sparsely occurring woodlands are dominated by valley oaks. Associated tree species in the Central Valley include California sycamore (*Platanus racemosa*), California black walnut (*Juglans californica*), California boxelder (*Acer negundo*), Oregon ash (*Fraxinus latifolia*), interior live oak (*Quercus wislizeni*), California buckeye (*Aesculus californica*), and blue oak (*Quercus douglasii*). At low elevations close to water, valley oak is associated with Fremont cottonwood (*Populus fremontii*) and willows (*Salix* spp.). Valley oak woodlands vary from open savannahs to closed canopy forests. Dense stands occur along natural drainages in deep soils. Tree density tends to decrease as one moves from lowlands to uplands. The understory shrub layer can be dense along drainages and very sparse in uplands. The shrub understory can consist of poison oak (*Toxicodendron diversilobum*), California wild grape (*Vitis californica*), toyon (*Heteromeles arbutifolia*), California coffeeberry (*Rhamnus californica*), and Himalayan blackberry (*Rubus discolor*). Understory grasses and forbs are mostly introduced annuals such as Italian ryegrass (*Lolium multiflorum*), ripgut brome (*Bromus diandrus*), Mediterranean barley (*Hordeum marinum*), yellow star thistle (*Centaurea solstitialis*), wild oats (*Avena* sp.), and tarweed (*Hemizonia fitchii*). Mature valley oaks have well-developed crowns and reach maximum heights of 50 to 120 ft. The massive trunks (often up to 6 feet dbh) and branches of mature trees are characteristic of valley oak woodlands.

General Locational Characteristics

Valley oaks are endemic to the state, meaning that they are found only in California. They occur in a patchy distribution throughout most major lowland valleys including the Sacramento-San Joaquin and those valleys occurring in the Coast Range and Transverse Range. Many valley oak woodlands occur as isolated stands in areas where surrounding habitats have been modified by agricultural, urban, and suburban activities. Annual grasslands, riparian forests, and other oak woodland types occur adjacent to valley oak woodlands. Conversion of valley oak woodlands to irrigated agricultural land uses has had the largest effect on the acreage decline of this community.

Physical Characteristics

Valley oak communities generally occur on deep, well-drained alluvial soils found in valleys and foothills below 2,400 feet in elevation.

Distribution in Placer County

In Placer County, valley oaks are typically associated with riparian corridors (**Figure 2**). A large intact woodland remains on the Bear River and other small stands are associated with major creek drainages in western Placer County (e.g., Auburn Ravine, Coon Creek and Dry Creek).

The majority of valley oaks were presumably cleared for fuel wood and to clear lands for farming activities. Today, the greatest threats to valley oak woodlands are lack of regeneration and continued losses due to agricultural practices and land development. The failure of valley oak regeneration seems to be related to competition for soil nutrients and moisture between oak seedlings and introduced annuals, consumption of acorns and seedlings by wild and domestic animals, and flood control projects. Valley oaks are tolerant of flooding while other components of the community that are potential predators or competitors are not. Fire suppression has encouraged live oak and pine invasion in upland valley oak sites.

Conservation/Restoration Objectives

The remaining valley oak woodlands should be protected and restoration should be a priority. Wherever possible, impacts to valley oaks should be avoided particularly when part of a large unfragmented woodland or connected to other unfragmented communities (e.g., riparian). Where impacts are necessary, prior to issuance of a tree permit, County staff should analyze the connection of onsite woodlands to adjacent woodlands. Impacts resulting in woodland fragmentation should be avoided. If impacts to valley oak woodlands are unavoidable, mitigation priority should be given to restoration of onsite woodlands when existing habitat value can be maintained or enhanced or restoration at an offsite location supporting valley oak woodland where a fragmented condition can be improved, habitat value can be enhanced, or where connectivity can be achieved.

2. Valley Foothill Riparian

Valley foothill riparian habitats are those plant communities supporting woody vegetation found along rivers, creeks and streams in western Placer County in the lower foothills of the Sierra Nevada and on the floor of the Sacramento Valley. Riparian habitat can range from a dense thicket of shrubs and low growing trees to a closed canopy of large mature trees covered by vines. (WHR type – Valley foothill riparian)

Vegetation Composition and Structure

This habitat has three distinct structural layers: canopy cover of 20-80 percent, subcanopy layer, and an understory shrub layer. Valley oaks, Fremont cottonwood and California sycamore are the dominant woody vegetation types along major streams. The sub-canopy trees include willows, Oregon ash, and white alder (*Alnus rhombifolia*). The understory shrub layer consists mostly of willows, wild rose (*Rosa californica*), Himalayan blackberry, and poison oak. Herbaceous vegetation including sedges, rushes, and grasses are also associated with the understory (Rogers et al., 1996). The valley foothill riparian community provides resources that make it the most biodiverse, densely populated habitat in the western United States, and it plays a crucial role in the migration and dispersal of wildlife as they use these riparian habitats for movement corridors (Rogers et al., 1996).

Riparian systems are one of our most important renewable natural resources. While small in total area when compared to California's size, they are of special value as wildlife habitat. Over 135 species of California birds such as the willow flycatcher, yellow-billed cuckoo and red-shouldered hawk either completely depend upon riparian habitats or use them preferentially at some stage in their life history. Another 90 species of mammals, reptiles, fish, invertebrates and

amphibians, including sensitive species such as California red-legged frog, Valley elderberry longhorn beetle and riparian brush rabbit, depend on California's riparian habitats. Riparian habitat provides food, breeding habitat, cover, and migration corridors for wildlife. This community also provides riverbank protection, erosion control and improved water quality, as well as numerous recreational and esthetic values.

General Locational Characteristics

The Valley Foothill Riparian community occurs along the California coast and inland to about 3,000 feet in elevation. It is often associated with valley bottoms along slow moving streams with deep alluvial soils and a high water table. It can also be associated with incised channels in steeper canyons but in these cases it is generally limited to the area immediately along the stream corridor.

Physical Characteristics

These are communities that usually consist of one or more species of deciduous trees plus an assortment of shrubs and herbs, many of which are restricted to the banks and flood plains of these waterways. The extent of the vegetation away from the watercourse depends on the size and nature of the banks and the flood plains, the amount of water carried by the stream or present in the lake, and very importantly on the depth and lateral extent of subterranean aquifers. Additionally, historical patterns of land use often determine the actual extent of the riparian corridor. Along small stream channels a riparian community may form a very narrow band, whereas along larger streams or in broad valleys with meandering stream courses, the riparian woodland or forest areas may be quite extensive. Rates of precipitation are consistent with those found in the blue oak woodland community (i.e., 20 to 60 inches annually).

Distribution in Placer County

Valley foothill riparian habitat in Placer County, like most regions in California, has seen a significant reduction in acreage since European settlement of the region. Clearing for agricultural practices, flood control, infrastructure development, road construction and land development have eliminated much of the riparian forests of western Placer County. Remaining habitat is associated with major stream corridors and the American and Bear Rivers. Auburn Ravine, Dry Creek and Coon Creek contain the largest expanses of contiguous valley foothill riparian in Placer County today (**Figure 3**). Other more seasonal streams include patches of fragmented riparian habitat. With the continued levels of current urban/suburban development, which result in increases in annual urban runoff, opportunities are created for valley foothill riparian habitat creation and restoration.

Conservation/Restoration Objectives

The first priority for valley foothill riparian is to avoid generating direct or indirect impacts on the resource. Where impacts cannot be avoided and habitat is to be displaced, onsite, in-kind replacement of habitat is to be encouraged including the reestablishment of a viable multi-story community structure. The planting of just overstory species is to be discouraged unless it is part of an overall strategy for the region. Typically, mitigation should occur at the location of the impact. However, given the potential for ongoing direct or indirect impacts associated with the ongoing land use approved at a site, offsite mitigation may be appropriate. When reviewing valley foothill riparian mitigation plans, staff should evaluate whether offsite mitigation may result in greater ecological benefits than onsite mitigation. Offsite mitigation should be considered if the offsite location could improve corridor connectivity, increase habitat value, or restore a significantly diminished resource.

3. Blue Oak Woodland

This natural community is generally dominated by blue oaks (*Quercus douglasii*). It is associated with the blue oak-foothill pine community as well. (WHR types – Blue oak woodland and blue oak-foothill pine)

Vegetation Composition and Structure

Blue oak woodlands are highly variable. Typically blue oak comprises 80-100 percent of the trees present. Foothill pine (*Pinus sabiniana*), California buckeye, valley oak, interior live oak, canyon live oak (*Quercus chrysolepis*), and California black oak (*Quercus kelloggii*) are common associates of blue oak throughout its elevational distribution. Non-native annual grasses, similar to those found in valley oak woodlands, form most of the understory in open woodlands. Characteristic shrub species in this community include poison oak, California coffeeberry, and several species of ceanothus (*Ceanothus* spp.) and manzanita (*Arctostaphylos* spp).

Blue oak-foothill pine woodlands support a diverse mix of hardwoods, conifers, and shrubs. Blue oak interspersed with scattered foothill pine typically forms most of the overstory of this highly variable habitat type. In the Sierra Nevada foothills, interior live oak and California buckeye are often associated with this community. Interior live oak becomes more abundant on steeper slopes, shallower soils, and at higher elevations. Characteristic shrub associates include several ceanothus and manzanita species, poison oak, and western redbud (*Cercis occidentalis*).

Blue oaks are relatively slow-growing, long-lived trees. Most blue oak stands exist as groups of medium to large trees with few or no young oaks. In Placer County it is common to find even-aged stands due to the cessation of clearing activities that followed the decline in fruit orchard production in the mid-20th century. Acorns provide a food source for insects, livestock, and wildlife; however, increased consumption or damage of acorns may be a contributing factor to lower levels of successful oak regeneration. In heavily grazed areas, regeneration is rare due to the consumption of seedlings by cattle.

General Locational Characteristics

Blue oak woodlands form a nearly continuous band along the Sierra Nevada-Cascade foothills of the Sacramento-San Joaquin Valley. As a natural community, the blue oak woodland is not broadly distributed throughout the state but it is prevalent throughout the Sierra Nevada foothills. Because of existing and projected growth and development in the foothill region, ongoing fragmentation and direct loss is anticipated to significantly impact this resource.

Physical Characteristics

Blue oak woodlands occur on a wide range of soils that are often shallow, rocky, infertile, but well-drained. Blue oak woodlands occur in dry, hilly terrain where the water table is usually unavailable to trees. Over the range of blue oaks, there is considerable climatic variation. Climates are typically Mediterranean, with mild wet winters and hot dry summers. Average annual precipitation ranges from 20 to 60 inches annually.

Distribution in Placer County

In Placer County, blue oak woodlands cover broad areas of the lower western slope foothills of the Sierra Nevada (**Figure 4**). Typically, blue oak woodlands are found below 3,000 to 4,000 feet in elevation. At lower elevations on gentle slopes, blue oak woodlands occur as large blocks with highly variable canopy cover. On steeper ground, blue oak woodlands occur in small patches interspersed with other habitats such as annual grasslands, chaparral, riparian forests, and other

types of oak woodlands. When found with extensive stands of foothill pine, blue oaks are associated with steeper, dryer slopes with shallower soils than blue oak woodlands. At lower elevations on gentle slopes, these two communities intermix with grasslands and valley oak woodlands. At higher elevations on steeper slopes, the communities are mixed with grasslands and shrublands. Riparian woodlands may bisect these natural communities along permanent and intermittent watercourses.

In addition to continued fragmentation, there is a concern over blue oak recruitment. Poor blue oak recruitment from acorns may be occurring for several reasons. Introduced annual grasses out-compete blue oak seedlings for soil moisture. In addition, acorns and seedlings are eaten or damaged by insects, domestic livestock, and wildlife. Blue oak is also somewhat intolerant of shady conditions, and is unable to survive under dense overstory canopies. Disturbances creating small openings in the canopy may be needed for seedlings to survive and grow sufficiently to promote a broader age class distribution. Furthermore, reduction in annual grass biomass through fire, limited grazing, or weeding may increase seedling growth and survival.

Conservation/Restoration Objectives

Conservation of large blocks of unfragmented habitat is a high priority for this natural community. The greatest percentage of historic blue oak woodland habitat in Placer County was first eliminated for firewood, fuelwood and agricultural clearing. Regeneration has occurred but largely in a fragmented rural residential setting where habitat values are severely diminished. Active management of blue oak woodlands has increased regeneration in some areas. Recruitment enhancement techniques include reducing the intensity and duration of browsing pressure on woody vegetation, using fire to manipulate the understory, creating gaps in the canopy, and minimizing livestock use until regenerating blue oak saplings are taller than the browse level. For maintaining biodiversity in oak woodlands it is also necessary to conserve important habitat elements such as snags and downed wood (P. Brussard, Pers. Comm.).

There are extensive areas of unfragmented blue oak woodland remaining in the unincorporated area of Placer County, mostly near the Bear River between Meadow Vista and Camp Far West Reservoir. These areas are contiguous to other similar unfragmented areas in Nevada and Yuba Counties near the Spenceville Wildlife Area. Where possible efforts should be made to protect these and other large unfragmented communities, particularly where such areas also include valley foothill riparian habitat. Project sites supporting blue oak woodland should be evaluated to determine whether project-related impacts would result in fragmentation of a contiguous stand either on the site or in adjacent parcels. The conservation of this community should be a priority. Suitable mitigation should include offsite conservation and restoration with the goal of improving the habitat value of the conservation site. Onsite mitigation is recommended if a large stand contiguous with adjacent woodlands is incorporated into the mitigation design and habitat value can be maintained or improved.

4. Montane Hardwood

This natural community is dominated by a variety of hardwood species with black oak and canyon live oak being the dominant oak species. The hardwood forest will mosaic with forests typical to the Sierran mixed conifer. (WHR types – Montane hardwood, montane hardwood-conifer and aspen)

Vegetation Composition and Structure

The montane hardwood forests of the Sierra Nevada are one of the most variable of any California hardwood type. The dominant species vary by topography, soils, and elevation. The

canopy is often dense and bi-layered with a limited understory. One notable characteristic of montane hardwood forests is the lack of blue oaks and valley oaks. The characteristic oaks are canyon live oak, interior live oak, and California black oak.

Canyon live oak often forms almost pure stands on steep canyon slopes and rocky ridge tops throughout the Sierra Nevada. Such stands are prevalent in Placer County as well as along the many steep canyonlands of the west slope. These habitats are characteristic of steep, rocky, south-facing slopes of major river canyons and interface with mixed hardwood-conifer, ponderosa pine, and Sierran mixed-conifer habitats. Canyon live oak trees have tremendously variable growth forms, ranging from shrubs with multiple trunks on rocky, steep slopes, to 60 to 70 foot tall trees on deeper soils in moister areas.

Interior live oak occurs with canyon live oak or alone on steep canyon slopes and rocky, steep slopes throughout the Sierra Nevada. Its growth form varies much like canyon live oak. Both of these evergreen oaks have dense canopies.

Throughout the same range, California black oak tends to dominate on gentle topography at higher elevations. It grows to heights of 70 to 80 feet at maturity, with long, straight trunks in closed canopy situations. In open forests, California black oak has larger, spreading branches.

Bigleaf maple (*Acer macrophyllum*) also occurs in this community in cool areas, near low mountain streams and in alluvial river bottoms. Bigleaf maple generally prefers moist, gravelly and rich soils. It is also found on sites that have been disturbed due to fires or logging.

Associates of montane hardwood communities at higher elevations include ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), Pacific madrone, Jeffrey pine (*Pinus jeffreyi*), sugar pine (*Pinus lambertiana*), incense cedar (*Calocedrus decurrens*), white fir (*Abies concolor*) and quaking aspen (*Populus tremuloides*). At lower elevations and poor soils with steep slopes, associates include foothill pine, knobcone pine (*Pinus attenuata*), tan oak (*Lithocarpus densiflorus*), and Pacific madrone (*Arbutus menziesii*). Understory shrub species include poison oak, ceanothus, manzanita, mountain mahogany (*Cercocarpus* sp.), coffeeberry, wild currant (*Ribes* spp.), and mountain misery (*Chamaebatia foliolosa*). Forbs and grasses are not as prevalent as on lower elevation hardwood rangeland types. Montane hardwood forests have a pronounced hardwood tree layer with poorly developed shrub and herbaceous layers.

General Locational Characteristics

Montane hardwoods range throughout California from 300 feet in elevation near the coast to elevations approaching almost 9,000 ft in southern California. Surrounding habitats include conifer-dominated types, chaparral types, blue oak and valley oak woodlands, and exotic annual grasslands.

Physical Characteristics

A wide range of physical characteristics affect montane hardwood forests. Slopes range from gentle to steep. Soils are mostly rocky, coarse, and poorly developed. However, relatively large California black oak stands occur in mountain valleys on alluvial soils. Exposures tend to be south, west, and east, while conifers tend to dominate on northern exposures. Climates are typically Mediterranean but extremely variable given the wide distribution of this type. Average summer temperatures are moderate, while average winter temperatures range from near freezing to the mid-40's. Snow occurs in the winter at higher elevations, but does not remain as long as on adjacent conifer-dominated habitats.

Distribution in Placer County

Montane hardwood forests cover a wide area of Placer County on the western slopes of the Sierra Nevada. Because it intermixes with coniferous forests and the blue oak woodland communities, at times it can be hard to distinguish as a separate community. It is most prevalent as a distinct community in the steep canyonlands of the river systems of the western slope (e.g., Bear River, Rubicon River and North/Middle Fork American River) (**Figure 5**).

Conservation/Restoration Objectives

The large number of hardwood and conifer species allows this type to occupy many environments and locations. The general inaccessibility of these habitats has protected them from many of the human-induced disturbances such as intensive agricultural, residential and commercial development, grazing, and woodcutting. However, impacts are still anticipated largely from rural residential development, and some clearing for road building and logging. Other impacts can be anticipated with catastrophic loss due to fire. Between fuel load accumulations and the increasing amount of wildland/rural residential interfaces, the likelihood of catastrophic fires increases each year.

Mitigation for impacts should occur onsite, in-kind where possible. There may be occasions where additional onsite plantings may not be appropriate given fuel management concerns onsite or with the residential/wildland interface with the surrounding forest. When onsite replacement is not feasible or preferable, offsite conservation should take precedence over offsite mitigation (i.e., replacement).

5. Montane Riparian

Montane riparian generally consists of narrow, often dense groves of broadleaved, deciduous trees along streams in the Sierra Nevada. (WHR type – Montane riparian)

Vegetation Composition and Structure

This habitat is characterized by open to dense, broadleaved, winter-deciduous shrubby riparian thickets usually dominated by several willow, alder and dogwood species. It is associated with lakes, ponds, meadows, rivers, streams, and springs. Montane riparian often occurs as stringers of shrubby willows or alders along creeks or seeps; in other situations an overstory of white alder, quaking aspen (*Populus tremuloides*), black cottonwood (*Populus balsamifera*), and willows may be present. The understory is typically sparse except in high elevations where no overstory trees may be present and only the shrub species occur.

General Locational Characteristics

This community is widely scattered above 5,000-7,000 feet in elevation, throughout montane parts of the Klamath, Sierra Nevada, and southern California mountains. Even though it is widely distributed it covers only a very small percentage of the montane region. Some studies indicate that it covers 0.002% of the Sierra Nevada.

Physical Characteristics

Montane riparian communities are typically found on relatively fine-textured alluvium along fairly low-gradient reaches of snowmelt fed streams.

Distribution in Placer County

Like elsewhere in the Sierra Nevada, montane riparian has a limited distribution in Placer County (**Figure 6**). It is generally limited to environments along watercourses, where riparian plant species are adapted to seasonal inundation by water. Unlike the valley foothill riparian

community, Placer County does not have a focused assessment detailing its spatial distribution. Mapping prepared by the U.S. Forest Service provides some information on general distribution.

Conservation/Restoration Objectives

Montane riparian provides important habitat and migration corridors for many species of amphibians, reptiles, birds, and mammals and modulates associated aquatic habitats for fish and invertebrates. About 21% of Sierran vertebrates and at least 17% of Sierran plants are associated with montane riparian and associated wet areas. Montane riparian areas have been damaged extensively by placer mining, grazing and locally by dams, ditches, flumes, pipelines, roads, timber harvest, residential development, and recreational activities. According to the Sierra Nevada Ecosystem Project (SNEP) report, impacts have led to a significant widespread problem of riparian fragmentation, with the almost certain loss of important riparian function. Some riparian attributes can recover quickly after a disturbance is removed (e.g., regrowth of plants, energy and nutrient cycling, stream shading); others may require active restoration measures. Greatly altered stream channels will take a long time to restore or may be beyond restoration.

Because of the extent of impacts upon this resource in Placer County and elsewhere throughout the Sierra Nevada range, avoidance and or preservation is the first priority when evaluating projects. Where impacts occur, restoration of in-kind habitat on site should occur. Out of kind mitigation is not appropriate for this resource type. Where offsite mitigation occurs it should be in the form of restoration in areas where fragmented resources can be connected improving the overall connectivity of the community.

6. Sierra Nevada Montane Forest

Like the montane hardwood community, the Sierra Nevada montane forest contains a wide range of species with conifers being the dominant vegetative type. These forests are also referred to as yellow pine forests and mixed conifer forests. The elevation range differentiates this community from the Sierra Nevada Upper Montane Forest discussed below. (WHR types – Sierran mixed conifer, white fir, jeffrey pine, ponderosa pine, eastside pine, and closed-cone pine cypress)

The forest typically is characterized by having a closed, multi-layered canopy. Where canopy openings occur, shrubs are common in the understory. At maturity, the dominant conifers range between 100-200 ft. in height.

Vegetation Composition and Structure

Six conifers typify the mixed Sierra Nevada Montane forest – white fir, Douglas-fir, ponderosa pine, Jeffrey pine, sugar pine, and incense-cedar. The lower elevations (2,000 ft.) are often covered by forests dominated by ponderosa pine. At higher elevations (2,500-4,000 ft.) a mixed conifer forest becomes common, and at even higher elevations (5,500-6,000 ft.) white fir forests are extensive.

This community is often referred to as the "Yellow pine forest" which is a collective term for ponderosa pine and Jeffrey pine forests. Although ponderosa pine is the dominant yellow pine of the western slopes of the Sierra Nevada, a similar but distinct variant, the Jeffrey pine, grows in the more xeric (i.e., dry) environments and is more common on the eastern slopes. Another collective term for this community is "Mixed conifer forest", which includes varying mixes of ponderosa pine, knobcone pine, sugar pine, incense-cedar, Douglas-fir, and white fir. Higher elevations in the zone have forests dominated by white fir. The vegetation mosaic may also include western white pine (*Pinus monticola*). Deerbrush (*Ceanothus integerrimus*), manzanita,

chinquapin (*Chrysolepis sempervirens*), tan oak, mountain whitethorn (*Ceanothus cordulatus*), sagebrush (*Artemisia* spp.), gooseberry (*Ribes* spp.), and wild rose are common shrub species.

General Locational Characteristics

The Sierra Nevada Montane Forest is one of the most broadly distributed of all woodland types in the Sierra Nevada range. This community extends from the southernmost to the northernmost reaches of the range. It is predominately located along the western slope of the range, but also includes large areas along the eastern slope.

Physical Characteristics

According to the SNEP report, each of the many species that make up this community often are a mosaic of many communities. Small changes in topography, differences in soil and rock characteristics, and the history of disturbance (e.g., fire, storm blowdown, insect and pathogen activity, and avalanche) contribute to the complex mixture of patches that characterizes this forest. Plant patterns vary not only from place to place but also over time.

Distribution in Placer County

On the west slope, forest types change from ponderosa pine to mixed conifer to firs with increasing elevations. On the east slope the vegetation types evolve quickly due to changes in elevation, slope, precipitation and land use. The overall elevational distribution for this community is wide and typical species can be found between 2,000 feet and 8,000 feet (**Figure 7**).

Conservation/Restoration Objectives

The majority of this habitat type is located on private and public timberlands. However, there are large tracts of land designated for residential development that could be impacted along the Foresthill Divide, between the Bear River and the North Fork American River (i.e., the Interstate 80 corridor), the Tahoe Basin and the Martis Valley area. The public forests are managed by the U.S. Forest Service and the Bureau of Land Management for a variety of purposes including outdoor recreation, timber, and protection of the forest's biodiversity.

The emphasis should be on conserving significant stands of existing, high quality coniferous woodlands through the purchase of conservation easements or fee title. Where impacts to individual trees cannot be avoided, onsite mitigation should be recommended when large contiguous stands can be preserved. Properties should be evaluated by planning staff and woodland corridors should be designed within projects to avoid woodland fragmentation. Onsite stands preserved should be contiguous with woodlands in adjacent parcels. When the biological integrity of onsite communities cannot be preserved, mitigation emphasis should focus on offsite conservation of large stands contiguous with other woodland resources. If the impacted woodland includes montane riparian habitat avoidance should occur around those areas adjacent to the riparian resource, including the establishment of a suitable buffer.

7. Sierra Nevada Upper Montane Forest

This natural community represents the upper elevation of the broad coniferous forests of the Sierra Nevada. The woodlands often represent relatively monotypic stands of red fir (*Abies magnifica*) or lodgepole pine (*Pinus contorta*) with one species or the other typically dominant. Other species include western white pine and white fir (at the lower elevations of the zone). Mountain hemlock (*Tsuga mertensiana*) may be found at the upper elevations of the zone. (WHR types – Red fir, and lodgepole pine)

Vegetation Composition and Structure

Upper montane elevations of the Sierra Nevada are dominated by a set of conifer forests. The lodgepole pine and red fir communities are the keynote forests found throughout the zone. For red fir and lodgepole pine, stand structure is typified by monotypic, even-aged stands with very few other plant species in any layer. Montane riparian stands of black cottonwood, aspen and narrowleaf willow (*Salix exigua*) may be found along streams within this community.

Lodgepole pine

Lodgepole pine habitats are typically found below or intermixed with red fir habitats. Lodgepole pine usually forms monotypic stands; occasional associates include aspen, red fir, and mountain hemlock. The understory is typically sparse except where lodgepole pine habitats are associated with meadow edges. Lodgepole pines establish rapidly and reproduce at an early age. This continued recruitment within stands produces overcrowding which weakens the trees making them susceptible to insects. Dead and moribund trees create large quantities of fuel that increase the probability of wildfire. The lodgepole pine habitat type has low structural diversity and supports relatively few animal species. However, the wolverine, northern goshawk, and bald eagle, all Placer County species of particular interest, use lodgepole pine habitat, particularly at meadow edges.

Red fir

In Placer County, red fir habitats occur on frigid soils in the higher elevations of the Sierra Nevada. These habitats are usually monotypic with very few plant species other than red fir in any layer. Heavy shade and a thick layer of duff tend to inhibit understory vegetation. Windthrows, lightning fires, insect outbreaks, and logging tend to create an even-aged stand structure. At lower elevations red fir habitats intergrade with mixed conifer habitats on drier sites and with lodgepole pine on wetter sites. At higher elevations, red fir habitats intergrade with subalpine conifer habitats (see community number 8 below). Northern goshawk, Sierra Nevada red fox, California wolverine, and a number of other sensitive and rare species, utilize red fir habitats.

General Locational Characteristics

The Upper Montane Forest is located in higher elevations of the east and west slopes of the Sierra Nevada.

Physical Characteristics

The Sierra Nevada Upper Montane Forest is typically found at an elevation of 6,800 to 9,000 feet where snow and rain precipitation, especially on the west slope, can be significant. Lodgepole pine will typically occupy areas with seasonally wet soils and can be commonly associated with meadows. Red fir is typically associated with mesic (moderately moist) conditions on young soils. Compared to other forest types, a large proportion of the forest nutrient capital is in the litter on the forest floor.

Distribution in Placer County

This woodland is found at the higher elevations of the Sierra Nevada and consequently its distribution is somewhat limited in Placer County (**Figure 8**). Lodgepole pine woodlands are typically lower in elevation than the red fir woodlands but they will intermix.

Conservation/Restoration Objectives

The Sierra Nevada Upper Montane Forest may generally contain fewer and a less diverse flora and fauna than do lower elevation forests. However, several species of particular interest in

Placer County, including Northern Goshawk, California wolverine, pine martin, Sierra Nevada red fox, and California Spotted Owl, occupy this community.

Where impacts to individual trees cannot be avoided, onsite mitigation should be recommended when large contiguous stands can be preserved. Properties should be evaluated by planning staff and woodland corridors should be designed within the project to avoid woodland fragmentation. Onsite stands preserved should be contiguous with woodlands in adjacent parcels. When the biological integrity of onsite communities cannot be preserved, mitigation emphasis should focus on offsite conservation of large stands contiguous with other woodland resources. If the impacted woodland includes montane riparian habitat avoidance should occur around those areas adjacent to the riparian resource including the establishment of a suitable buffer.

8. Sierra Nevada Subalpine Forest

This community represents the highest in elevation of the woodlands in Placer County. Typical species are coniferous and are predominately of the *Pinus* genus. Higher elevation habitats do not support woody vegetation. (WHR type – Subalpine conifer)

Vegetation Composition and Structure

Typical subalpine conifer habitats are open forests of several species of conifers of low to medium stature. Placer County species include western white pine, lodgepole pine, and mountain hemlock. A sparse shrub understory may be present. Subalpine conifer habitats intergrade with red fir and lodgepole pine habitats at lower elevations and with alpine dwarf shrub habitats at timberline. Near timberline the trees are shaped by wind and snow into rummholtz, shrubby, mat-like forms only a few feet tall. In Placer County, although fires and windstorms provide natural disturbance in this habitat, this community has sustained minimal human influenced disturbance. Because of the severe climate and short growing season, this habitat supports fewer wildlife species than any other forested habitat in the state. However, the California wolverine, a Placer County species of particular interest, finds subalpine conifer habitat suitable.

General Locational Characteristics

This habitat is widely distributed at high elevations in all significant mountain ranges of the state. In the Sierra Nevada, it is commonly associated with elevations of 8,500-11,000 ft.

Physical Characteristics

Soils are generally thin and of low quality consisting of coarse sand, gravel, and rocks from decomposing parent material. The climate is harsh with large amount of precipitation including heavy snowfall.

Distribution in Placer County

This community is very limited in Placer County due to the small amount of high elevation areas that support this vegetative community. Other areas of the Sierra Nevada contain larger areas with elevations in excess of 8,500 ft. and consequently this woodland community is better represented in those areas (**Figure 9**).

Conservation/Restoration Objectives

The primary objective is to avoid impacts on this resource altogether because of its scarcity and fragility. Few impacts are to be anticipated due to the limited timber production values and because general plan designations for the most part do not encourage or accommodate growth in this area. Where impacts do occur they should be replaced onsite, in-kind wherever possible. The total footprint of an impact should be extremely limited wherever possible.

9. Sierra Nevada Juniper Woodland

Juniper woodlands are limited to the eastern Sierra Nevada in the Martis Valley area. They are characterized as woodlands of open to dense aggregations of junipers and are often associated with a mix of conifers. (WHR types – Juniper, bitterbrush, and sagebrush)

Vegetation Composition and Structure

Stands of western juniper (*Juniperus occidentalis*) are located on the xeric (dry) eastern slopes of the Sierra Nevada. Jeffrey pine, ponderosa pine and white fir may occur in more mesic (i.e., moderately moist) areas, particularly along watercourses. The dominant shrubs are often big sagebrush (*Artemisia tridentata*), black sagebrush (*Artemisia nova*), bitterbrush (*Purshia tridentata*), California buckwheat (*Eriogonum fasciculatum*), or wax current (*Ribes cereum*).

General Locational Characteristics

This woodland community is broadly distributed throughout the west in North America. The western juniper commonly grows on the high plains and mountain slopes of eastern Washington and Oregon, western Idaho and northeastern California. In California, it is also found along the eastern Sierran slopes on south to the San Bernadino range and even further into Baja California. Within this wide range, the western juniper grows at elevations ranging from sea level to 10,000 feet.

Physical Characteristics

This community is typically found on xeric slopes in the eastern Sierra Nevada at elevations of 5,000-7,000 feet. It typically occupies areas with long dry summers, cold winters, and limited moisture. On good sites this juniper does not compete well with other species, therefore it is limited to and tends to colonize on poorer, rocky sites where competition is lower.

Distribution in Placer County

This habitat type is very limited in Placer County and is only found on xeric (i.e., dry) slopes in the Martis Valley area east of the Sierra crest near the Town of Truckee (**Figure 10**).

Conservation/Restoration Objectives

Due to the limited amount of this habitat in Placer County few impacts are anticipated. However, where impacts do occur they should be mitigated onsite with in-kind replacement of the function and value of the resource present. Where onsite replacement is not possible or would not accomplish these objectives, offsite conservation should take priority over “re-creation” of the resource values lost.

EAST COUNTY EXEMPTIONS

Fuels within heavily forested areas may exceed healthy forest standards, and as such, may require the removal of trees in order to restore the forest to a healthy condition. Consequently, the recommendations outlined in a site's forest management plan may contradict the mitigation standards proposed in this policy. As such, per the boundary defined in Figure 1, east County projects greater than or equal to 20 acres in size and supporting one dwelling unit per 4.6 acres or lower in density are exempt from this policy. Woodland mitigation for projects meeting these exemption criteria would be analyzed subject to the CEQA review process. Staff preparing the mitigation measures should evaluate the project site's current fuel load and propose mitigation in-line with the objectives identified in this report for the woodland type occurring on the site. Such measures may closely follow the in-lieu fee structure outlined herein.

MITIGATION MEASURES

The mitigation measures vary for each of the natural communities. Each mitigation measure is intended to reflect the conservation/restoration objective for each oak woodland community type. For each woodland community the following standards are provided: 1) tree replacement, 2) understory replacement and 3) in-lieu fee payment when onsite or offsite replacement is not feasible or preferred.

In general the replacement of woodlands lost is to be encouraged over the payment of in-lieu fees. However, it is recognized that with the anticipated displacement of habitat that is associated with certain discretionary land uses, complete or even partial replacement of habitat may not be possible. Therefore, in-lieu fee payments may be made to cover the entire cost of mitigating habitat losses when no portion is to be replaced onsite or offsite **or** such payments may be made in combination with the partial replacement of habitat provided by the proponent.

The conservation fee and in-lieu fee identified for each woodland category may be used by the Planning Department to purchase conservation easements from local landowners or mitigation banks that can provide land supporting similar woodland types as those impacted. Such fees should be maintained in separate accounts based on the geographic area and vegetation type affected, in order to ensure that replacement/conservation directly relates to the areas of impacts.

Projects requiring a specific plan or creating greater than 100 dwelling units may elect to propose a mitigation plan unique from the standards outlined in this policy. The degree to which the proposed plan meets the goals and objectives of the policy outlined in this report will be left to the discretion of the Planning Department.

Valley Oak Woodland

Mitigation Objective

Wherever practical, impacts to valley oak woodlands are to be avoided due to their limited spatial distribution in Placer County and elsewhere in California. Individual or small groups of trees are considered a high priority for avoidance if they are associated with adjacent or nearby riparian habitat. Where avoidance is not practicable, mitigation shall be required onsite with in-kind species to replace the woodland values lost. If the biological function of the woodland cannot be replaced onsite, offsite, in-kind replacement shall occur. Offsite mitigation shall be acceptable where the full function and value of valley oak woodland can be replaced and protected in perpetuity. Offsite mitigation will be deemed preferable if the resulting project will likely generate direct or indirect impacts upon the recreated habitat. No out-of-kind mitigation shall be allowed for valley oak woodlands. All trees and shrubs planted shall be purchased from a locally adapted genetic stock obtained within 50 miles and 1,000 feet in elevation of the project site. Planting densities shall not exceed 250 trees and shrubs for each acre planted. The maintenance and monitoring plan shall include cages for each seedling, identify a weed control schedule, and outline a watering regime for the plantings.

Onsite/Offsite tree replacement standard

- One 15-gallon valley oak (*Quercus lobata*) tree for each tree removed, and
- One deepot-40 valley oak seedling for each inch removed measured at dbh, and
- 5-years annual monitoring with remedial planting if mortality exceeds 20%, and
- \$200/tree for offsite conservation/restoration activities.

AND

Onsite/Offsite understory replacement standard

- Shrub understory present – For each tree removed provide three 1-gallon plants including one or more of the following: California wild grape (*Vitis californica*), blue elderberry (*Sambucus mexicana*), toyon (*Heteromeles arbutifolia*), California coffeeberry (*Rhamnus californica*) and/or California blackberry (*Rubus ursinus*).
- Shrub understory not present – no shrub replacement requirement.
- Grass understory – Throughout each planting site, a grass mix shall be seeded. Mix should include blue wildrye (*Elymus glaucus*), purple needle grass (*Nassella pulchra*), and one-sided bluegrass (*Poa secunda*).

OR

In-lieu payment

- Tree replacement – A proponent shall pay \$100 for each tree removed and \$15 for every inch lost measured at dbh. This cost is intended to be sufficient to purchase and plant one 15-gallon tree and a deepot-40 seedling for each inch removed. A proponent may also pay an amount, provided in writing from a verifiable and knowledgeable source (i.e., native plant nursery, arborist or restoration specialist), equal to the above ratio of replacement, and
- Understory replacement – For each tree removed a proponent shall pay \$45 or an amount equal to the cost of purchasing and planting three 1-gallon shrubs. If no understory is present, no in-lieu payment is to be required, and
- Monitoring and Maintenance – For each inch removed the proponent shall pay \$10 to cover the County-incurred cost of maintenance and monitoring tree replacement activities, and
- \$200/tree for offsite conservation/restoration activities.

Valley Foothill Riparian

Mitigation Objective

Valley foothill riparian areas are to be avoided as a high priority due to their limited spatial distribution in Placer County. Avoidance should include an upland buffer component such as oak woodlands, grassland savannah and/or the floodplain where a floodplain is apparent. Where avoidance is not feasible or practicable (e.g., bridge or utility crossings), provide onsite, in-kind replacement of the full function and value of the natural community. In general, offsite mitigation is not a viable option for perennial streams unless there is insufficient area for onsite replacement or the ongoing land use activity causing the impact will generate permanent direct and/or indirect impacts. Off-site mitigation may be considered for intermittent and/or ephemeral streams that include riparian vegetation. All trees and shrubs planted shall be purchased from a locally adapted genetic stock obtained within 50 miles and 1,000 feet in elevation of the project site. Planting densities shall not exceed 450 trees, shrubs, and vines for each acre planted. The maintenance and monitoring plan shall include cages for each seedling, identify a weed control schedule, and outline a watering regime for the plantings.

Onsite/Offsite tree replacement standard

- One 15-gallon cottonwood (*Populus fremontii*), California sycamore (*Platanus racemosa*), valley oak (*Quercus lobata*), white alder (*Alnus rhombifolia*), boxelder (*Acer negundo*) or Oregon ash (*Fraxinus latifolia*) for each tree removed, and
- One deepot-40 cottonwood (*Populus fremontii*), California sycamore (*Platanus racemosa*), valley oak (*Quercus lobata*), white alder (*Alnus rhombifolia*), boxelder (*Acer negundo*) or Oregon ash (*Fraxinus latifolia*) seedling for each inch removed measured at dbh. Emphasis should be on purchasing species at ratios equivalent to the species lost, and
- 5-years annual monitoring with remedial planting if mortality exceeds 20%, and,
- \$200/tree removed for offsite conservation/restoration activities.

AND

Onsite/Offsite understory replacement standard

- Shrub understory present – For each tree removed provide three 1-gallon plants including one or more of the following: California wild grape (*Vitis californica*), blue elderberry (*Sambucus mexicana*), toyon (*Heteromeles arbutifolia*), California coffeeberry (*Rhamnus californica*) and/or California blackberry (*Rubus ursinus*).
- Grass understory – Throughout each planting site, a grass mix shall be seeded. Mix should include sedge (*Carex barbarae*), slender wheatgrass (*Elymus trachycaulus*), and meadow barley (*Hordeum brachyantherum*).

OR

In-lieu fee payment

- Tree replacement – For each tree removed a proponent shall pay \$100 and \$15 for every inch lost. This cost is intended to be sufficient to purchase and plant one 15-gallon tree and a deepot-40 seedling for each inch removed. A proponent may also pay an amount, provided in writing from a verifiable and knowledgeable source (i.e., native plant nursery, arborist or restoration specialist), equal to the above ratio of replacement, and
- Understory replacement – For each tree removed a proponent shall pay \$45 or an amount equal to the cost of purchasing and planting three 1-gallon shrubs, and
- Monitoring and Maintenance – For each inch removed the proponent shall pay \$10 to cover the County-incurred cost of maintenance and monitoring tree replacement activities, and
- \$200/tree removed for offsite conservation/restoration activities.

Blue Oak Woodland

Mitigation Objective

The emphasis will be on the maintenance of large, interconnected patches of unfragmented woodlands. Connectivity may take into consideration the relationship to

habitat on adjoining properties where the condition of the adjoining resource is understood from a conservation perspective. Connectivity may include non-oak woodland natural communities including grassland savannah, foothill pine and valley foothill riparian. Individual trees may be protected for aesthetic or soil retention purposes. However, protection of individual trees in a fragmented, developed environment does not reduce or eliminate the responsibility for the function and value loss of intact oak woodlands if they were present on the site prior to construction. Where avoidance is not possible, large-scale conservation is encouraged offsite. Replacement trees may be placed onsite in combination with off-site conservation. All trees and shrubs planted shall be purchased from a locally adapted genetic stock obtained within 50 miles and 1,000 feet in elevation of the project site. Planting densities shall not exceed 250 trees and shrubs for each acre planted. The maintenance and monitoring plan shall include cages for each seedling, identify a weed control schedule, and outline a watering regime for the plantings.

Onsite/Offsite tree replacement standard

- One 15-gallon blue oak (*Quercus douglasii*), valley oak (*Quercus lobata*) or interior live oak (*Quercus wislizeni*) tree for each tree removed. Emphasis should be on purchasing species at ratios equivalent to the species lost, and
- One deepot-40 seedling, in-kind, for each inch removed measured at dbh, and
- 5 years annual monitoring with remedial planting if mortality exceeds 20%, and,
- \$200/tree removed for landscape-scale conservation.

AND

Onsite/Offsite understory replacement standard

- Shrub understory present - For each tree removed provide three 1-gallon plants including one or more of the following: California coffeeberry (*Rhamnus californica*), buckbrush (*Ceanothus cuneatus*), California coffeeberry (*Rhamnus californica*), California buckeye (*Aesculus californica*), manzanita (*Arctostaphylos* spp.) or other native shrubs that are present on the site.
- Shrub understory not present – no replacement requirement.
- Grass understory – Throughout each planting site, a grass mix shall be seeded. Mix should include blue wildrye (*Elymus glaucus*), purple needle grass (*Nassella pulchra*), and one-sided bluegrass (*Poa secunda*).

OR

In-lieu payment

- Tree replacement – For each tree removed a proponent shall pay \$100 and \$15 for every inch lost. This cost is intended to be sufficient to purchase and plant one 15-gallon tree and a deepot-40 seedling for each inch removed. A proponent may also pay an amount, provided in writing from a verifiable and knowledgeable source (i.e., native plant nursery, arborist or restoration specialist), equal to the above ratio of replacement, and

- Understory replacement – For each tree removed a proponent shall pay \$45 or an amount equal to the cost of purchasing and planting three 1-gallon shrubs. If no understory is present, no in-lieu payment is to be required, and
- Monitoring and Maintenance – For each inch removed the proponent shall pay \$10 to cover the County-incurred cost of maintenance and monitoring tree replacement activities, and
- \$200/tree removed for landscape-scale conservation.

Montane Hardwood

Mitigation Objective – Due to a variety of factors mitigation should be determined on a project-by-project basis. No single mitigation standard is appropriate given the broad distribution and variability of this woodland. When developing a mitigation strategy, consideration should be given to onsite fuel loading, the wildland/residential interface, connectivity, presence/absence of sensitive habitats (e.g., montane riparian or wetlands) and opportunities to establish large unfragmented patches of viable habitat. In general, avoidance of large unfragmented areas of intact woodland is to be the first preference and offsite conservation of similar habitat types is preferred over extensive re-creation activities. The maintenance and monitoring plan shall include cages for each seedling, identify a weed control schedule, and outline a watering regime for the plantings.

Onsite/Offsite tree replacement standard

- One 15-gallon canyon live oak (*Quercus chrysolepsis*), bigleaf maple (*Acer macrophyllum*), interior live oak (*Quercus wislizeni*), California black oak (*Quercus kelloggii*), or associated coniferous species for each tree removed, and
- One deepot-40 seedling, in-kind, for each inch removed measured at dbh, and
- 5 years annual monitoring with remedial planting if mortality exceeds 20%, and,
- \$200/tree removed for offsite landscape-scale conservation.

AND

Onsite/Offsite understory replacement standard

- Understory present - For each tree removed provide three 1-gallon plants including one or more of the following: wild currant (*Ribes* sp.), wood rose (*Rosa gymnocarpa*), snowberry (*Symphoricarpos albus* var. *laevigatus*), manzanita (*Arctostaphylos* spp.), or other shrubs that are present on the site.
- Shrub understory not present – no shrub replacement requirement.
- Grass understory present – Throughout each planting site, a grass mix shall be seeded. Mix should include blue wildrye (*Elymus glaucus*), squirreltail (*Elymus elymoides*), slender wheatgrass (*Elymus trachycaulus*), Idaho fescue (*Festuca idahoensis*), nodding needlegrass (*Nassella cernua*).

OR

In-lieu payment

- Tree replacement – For each tree removed a proponent shall pay \$100 and \$15 for every inch lost. This cost is intended to be sufficient to purchase and plant

one 15-gallon tree and a deep-pot 40 seedling for each inch removed. A proponent may also pay an amount, provided in writing from a verifiable and knowledgeable source (i.e., native plant nursery, arborist or restoration specialist), equal to the above ratio of replacement, and

- Understory replacement – For each tree removed a proponent shall pay \$45 or an amount equal to the cost of purchasing and planting three 1-gallon shrubs. If no understory is present, no in-lieu payment is to be required, and
- Monitoring and Maintenance – For each inch removed the proponent shall pay \$10 to cover the County-incurred cost of maintenance and monitoring tree replacement activities, and
- \$200/tree removed for landscape-scale conservation.

Montane Riparian

Mitigation Objective

Montane riparian areas are to be avoided as a high priority due to their limited spatial distribution and fragmented condition in Placer County. Avoidance should include an upland buffer component such as montane chaparral, montane hardwood, “yellow pine” woodlands, lodgepole pine, and red fir and/or wet meadows. Where avoidance is not feasible or practicable (e.g., bridge or utility crossings), provide onsite, in-kind replacement of the full function and value of the natural community. In general, offsite mitigation is not a viable option for permanent streams. Off-site mitigation may be considered for intermittent and/or ephemeral streams that include riparian vegetation. Offsite mitigation may be preferable if it can be demonstrated that the offsite location will significantly improve a severely damaged or fragmented woodland and overall ecological conditions are improved by authorizing the offsite mitigation. The maintenance and monitoring plan shall include cages for each seedling, identify a weed control schedule, and outline a watering regime for the plantings.

Onsite/Offsite tree replacement standard

- One 15-gallon willow (*Salix* spp.), white alder (*Alnus rhombifolia*), bigleaf maple (*Acer macrophyllum*), dogwood (*Cornus* sp.), quaking aspen (*Populus tremuloides*) or black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) for each tree removed. Emphasis should be on purchasing species at ratios equivalent to the species lost, and
- One deep-pot 40 seedling, in-kind, for each inch removed measured at dbh, and
- 5 years annual monitoring with remedial planting if mortality exceeds 20%, and
- \$200/tree removed for offsite, landscape-scale conservation.

AND

Onsite/Offsite understory replacement standard

- Understory present - For each tree removed provide three 1-gallon plants including one or more of the following: wild currant (*Ribes* sp.), wood rose (*Rosa gymnocarpa*), snowberry (*Symphoricarpos albus* var. *laevigatus*), manzanita (*Arctostaphylos* spp.), or other shrubs that are present on the site.
- Understory not present – no replacement requirement.

OR

In lieu payment

- Tree replacement – For each tree removed a proponent shall pay \$100 and \$15 for every inch lost. This cost is intended to be sufficient to purchase and plant one 15-gallon tree and a deepot-40 seedling for each inch removed. A proponent may also pay an amount, provided in writing from a verifiable and knowledgeable source (i.e., native plant nursery, arborist or restoration specialist), equal to the above ratio of replacement; and
- Understory replacement – For each tree removed a proponent shall pay \$45 or an amount equal to the cost of purchasing and planting three 1-gallon shrubs. If no understory is present, no in lieu payment is to be required; and
- Monitoring – For each inch removed the proponent shall pay \$10 to cover the County-incurred cost of monitoring tree replacement activities; and
- \$200/tree removed for landscape-scale conservation.

Sierra Nevada Montane Forest

Mitigation Objectives

Old Growth - Priority shall be given to avoiding impacts to old growth forests. Old growth can generally be defined as containing the one or more of the following attributes: 1) large old trees in the overstory, 2) several layers in the canopy, 3) a variety of mature tree species, 4) many standing dead trees, and 5) many dead and decaying logs on the ground. Protection, through avoidance, of large blocks of old growth forest shall precede consideration of impacts to these areas. Where impacts cannot be avoided, conservation of off-site old growth areas shall be given priority over planting programs. A professional/registered forester may be consulted in order to determine if the subject woodland is to be considered “old growth”.

Younger Forests - Impacts to younger forests, single trees, or even aged stand trees shall be mitigated with in-kind coniferous trees. Due to the variability of woodland communities in this ecozone, no single tree species is identified for replacement. Replacement species should be determined in the field and should be compatible with existing woodlands onsite or in the vicinity of the project.

No mitigation shall be required for dead, diseased or trees susceptible to fall where the fall of the tree would cause damage to individuals, structures, or utilities. However, if a dead or dying is determined to provide wildlife habitat (e.g., snag), high priority shall be given to avoidance.

Timber harvest plans, not associated with discretionary projects where the County is a lead agency, shall be reviewed independent of these policy standards.

Onsite/Offsite tree replacement standard

- One 15-gallon for each coniferous tree removed. Emphasis should be on purchasing species at ratios equivalent to the species lost, and
- One deepot-40 seedling, in-kind, for each inch removed measured at dbh, and
- 5 years annual monitoring with remedial planting if mortality exceeds 20%, and

- For young forests - \$100/tree removed for offsite, landscape-scale conservation.
- For old growth forests - \$500/tree removed for offsite, landscape-scale conservation.

Onsite/Offsite understory replacement standard

- No understory replacement standards are to be required for montane forests.

OR

In lieu payment

- Young Forest – For each tree removed a proponent shall pay \$100 and \$10 for every inch lost. This cost is intended to be sufficient to purchase and plant one 15-gallon tree and a deepot-40 seedling for each inch removed. A proponent may also pay an amount, provided in writing from a verifiable and knowledgeable source (i.e., native plant nursery, arborist or restoration specialist), equal to the above ratio of replacement, or
- Old Growth Forests – For each tree removed a proponent shall pay \$200 and \$10 for every inch lost. This cost is intended to be sufficient to purchase and plant two 15 gallon trees and a deepot-40 seedling for each inch removed. A proponent may also pay an amount, provided in writing from a verifiable and knowledgeable source (i.e., native plant nursery, arborist or restoration specialist), equal to the above ratio of replacement, and
- Monitoring – For each inch removed the proponent shall pay \$10 to cover the County-incurred cost of monitoring tree replacement activities.
- For young forests - \$100/tree removed for offsite, landscape-scale conservation.
- For old growth forests - \$500/tree removed for offsite, landscape-scale conservation.

Sierra Nevada Upper Montane Forest

Mitigation Objective

Old Growth - Priority shall be given to avoiding impacts to old growth forests. Old growth can generally be defined as containing the following attributes: 1) large old trees in the overstory, 2) several layers in the canopy, 3) a variety of tree species, 4) many standing dead trees, and 5) many dead and decaying logs on the ground. Protection, through avoidance, of large blocks of old growth forest shall precede consideration of impacts to these areas. Where impacts cannot be avoided, conservation of off-site old growth areas shall be given priority over planting programs.

Younger Forests - Impacts to younger forests, single trees, or even aged stand trees shall be mitigated with in-kind coniferous trees. Due to the variability of woodland communities in this ecozone, no single tree species is identified for replacement. Replacement species should be determined in the field and should be compatible with existing woodlands onsite or in the vicinity of the project.

No mitigation shall be required for dead, diseased or trees susceptible to fall where the fall of the tree would cause damage to individuals, structures, or utilities. However, if a

dead or dying is determined to provide wildlife habitat (e.g., snag), high priority shall be given to avoidance.

Timber harvest plans, not associated with discretionary projects where the County is a lead agency, shall be reviewed independent of these policy standards.

Onsite/Offsite tree replacement standard

- One 15-gallon for each coniferous tree removed. Emphasis should be on purchasing species at ratios equivalent to the species lost, and
- One deepot-40 seedling, in-kind, for each inch removed measured at dbh, and
- 5 years annual monitoring with remedial planting if mortality exceeds 20%, and
- For young forests - \$100/tree removed for offsite, landscape-scale conservation.
- For old growth forests - \$500/tree removed for offsite, landscape-scale conservation.

Onsite/Offsite understory replacement standard

- No understory replacement standards are to be required for montane forests.

OR

In lieu payment

- Young Forest – For each tree removed a proponent shall pay \$100 and \$10 for every inch lost. This cost is intended to be sufficient to purchase and plant one 15-gallon tree and a deepot-40 seedling for each inch removed. A proponent may also pay an amount, provided in writing from a verifiable and knowledgeable source (i.e., native plant nursery, arborist or restoration specialist), equal to the above ratio of replacement, or
- Old Growth Forests – For each tree removed a proponent shall pay \$200 and \$10 for every inch lost. This cost is intended to be sufficient to purchase and plant two 15 gallon trees and a deepot-40 seedling for each inch removed. A proponent may also pay an amount, provided in writing from a verifiable and knowledgeable source (i.e., native plant nursery, arborist or restoration specialist), equal to the above ratio of replacement, and
- Monitoring – For each inch removed the proponent shall pay \$10 to cover the County-incurred cost of monitoring tree replacement activities.
- For young forests - \$100/tree removed for offsite, landscape-scale conservation.
- For old growth forests - \$500/tree removed for offsite, landscape-scale conservation.

Sierra Nevada Subalpine Forest

Mitigation Objective

Old Growth - Priority shall be given to avoiding impacts to old growth forests. Old growth can generally be defined as containing the following attributes: 1) large old trees in the overstory, 2) several layers in the canopy, 3) a variety of tree species, 4) many standing dead trees, and 5) many dead and decaying logs on the ground. Protection, through avoidance, of large blocks of old growth forest shall precede consideration of

impacts to these areas. Where impacts cannot be avoided, conservation of off-site old growth areas shall be given priority over planting programs.

Younger Forests - Impacts to younger forests, single trees, or even aged stand trees shall be mitigated with in-kind coniferous trees. Due to the variability of woodland communities in this ecozone, no single tree species is identified for replacement. Replacement species should be determined in the field and should be compatible with existing woodlands onsite or in the vicinity of the project.

No mitigation shall be required for dead, diseased or trees susceptible to fall where the fall of the tree would cause damage to individuals, structures, or utilities. However, if a dead or dying is determined to provide wildlife habitat (e.g., snag), high priority shall be given to avoidance.

Timber harvest plans, not associated with discretionary projects where the County is a lead agency, shall be reviewed independent of these policy standards.

Onsite/Offsite tree replacement standard

- One 15-gallon for each coniferous tree removed. Emphasis should be on purchasing species at ratios equivalent to the species lost, and
- One deepot-40 seedling, in-kind, for each inch removed measured at dbh, and
- 5 years annual monitoring with remedial planting if mortality exceeds 20%, and
- For young forests - \$100/tree removed for offsite, landscape-scale conservation.
- For old growth forests - \$500/tree removed for offsite, landscape-scale conservation.

Onsite/Offsite understory replacement standard

- No understory replacement standards are to be required for montane forests.

OR

In lieu payment

- Young Forest – For each tree removed a proponent shall pay \$100 and \$10 for every inch lost. This cost is intended to be sufficient to purchase and plant one 15-gallon tree and a deepot-40 seedling for each inch removed. A proponent may also pay an amount, provided in writing from a verifiable and knowledgeable source (i.e., native plant nursery, arborist or restoration specialist), equal to the above ratio of replacement, or
- Old Growth Forests – For each tree removed a proponent shall pay \$200 and \$10 for every inch lost. This cost is intended to be sufficient to purchase and plant two 15 gallon trees and a deepot-40 seedling for each inch removed. A proponent may also pay an amount, provided in writing from a verifiable and knowledgeable source (i.e., native plant nursery, arborist or restoration specialist), equal to the above ratio of replacement, and
- Monitoring – For each inch removed the proponent shall pay \$10 to cover the County-incurred cost of monitoring tree replacement activities.
- For young forests - \$100/tree removed for offsite, landscape-scale conservation.

- For old growth forests - \$500/tree removed for offsite, landscape-scale conservation.

Sierra Nevada Juniper Woodland

Mitigation Objective

The mitigation objective for this resource shall be determined on a case-by-case basis. The subject woodland is not widely distributed in Placer County and impacts are expected to be minimal. As with other resources, avoidance of large patches of unfragmented habitat is to be encouraged.

Onsite/Offsite tree replacement standard

- One 15-gallon for each coniferous tree removed, and
- One deepot-40 seedling, in kind, for each inch removed measured at dbh, and
- 5 years annual monitoring with remedial planting if mortality exceeds 20%, and
- For young forests - \$100/tree removed for offsite, landscape-scale conservation.
- For old growth forests - \$500/tree removed for offsite, landscape-scale conservation.

Onsite/Offsite understory replacement standard

- No understory replacement standards are to be required for montane forests.

OR

In lieu payment

- Young Forest – For each tree removed a proponent shall pay \$100 and \$10 for every inch lost. This cost is intended to be sufficient to purchase and plant one 15-gallon tree and a deepot-40 seedling for each inch removed. A proponent may also pay an amount, provided in writing from a verifiable and knowledgeable source (i.e., native plant nursery, arborist or restoration specialist), equal to the above ratio of replacement, or
- Old Growth Forests – For each tree removed a proponent shall pay \$200 and \$10 for every inch lost. This cost is intended to be sufficient to purchase and plant two 15 gallon trees and a deepot-40 seedling for each inch removed. A proponent may also pay an amount, provided in writing from a verifiable and knowledgeable source (i.e., native plant nursery, arborist or restoration specialist), equal to the above ratio of replacement, and
- Monitoring – For each inch removed the proponent shall pay \$10 to cover the County-incurred cost of monitoring tree replacement activities.
- For young forests - \$100/tree removed for offsite, landscape-scale conservation.
- For old growth forests - \$500/tree removed for offsite, landscape-scale conservation.

Substitutions

Substitution of deepot-40 seedlings for treepot-4 seedlings shall be allowed at a 2:1 ratio (2 deepot-40 seedlings:1 treepot-4 seedling) given that deepot-40 seedlings are planted for 50% or

greater of the required seedling mitigation. Deepot-40 seedlings may be equally substituted (1:1) with 1-gallon plantings and treepot-4 seedlings may be equally replaced (1:1) with 5-gallon plantings.

LEC/MB/lec/mb
t:/cmd/cmdp/melissa/tree mitigation policy/Placer_tree_mitigation_policy_report 09 2004.doc

Appendix A

General Plan and Community Plan Policy

- **Placer County General Plan**
 - Pg. 40, Goal 1.I, Policy 1.I.2.
 - Pg. 42, Goal 1.K, Policy 1.K.4.d
 - Pg. 43, Goal 1.L, Policy 1.L.3.
 - Pg. 48 1.11b
 - Pg. 96, Section 5, Goal 5.A, Policy 5.A.4.f
 - Pgs. 104-120, Section 6- Natural Resources
 - Pgs. 125-126, Forest Resources
 - Pg. 127, Goal 8.A, Policy 8.A.5
 - Pg. 128, Goal 8.B, Policy 8.B.5
 - Pg. 129-130, Fire Hazards
- **Dry Creek/West Placer Community Plan**
 - Pg. 31, # 24-26, 28-31
 - Pg. 32, # 42
 - Pg. 37, Last sentence on page
 - Pg. 38 item #1
 - Pg. 41, First complete sentence
 - Pg. 41, Second complete paragraph
 - Pg. 43, In addition, a wooded...
 - Pg. 45-46, Greenbelt and Open Space
 - Pg. 52, Policies # 1
 - Pg. 53, Policies # 11
 - Pg. 54, Policies # 14
 - Pg. 82, 2nd to last paragraph
 - Pg. 92, Policy #2
 - Pg. 96, 2nd to last paragraph
 - Pg. 97, Goals # 1, 2, 5, 6 and 8
 - Pg. 98, Policies # 1, 2, 4, 6, 8, and 9
 - Pg. 99, Policies # 12, 13, 16, and 17
 - Pg. 100, Policies # 20(?), 22, 23, and 24
 - Pg. 102, Vegetation, #1
 - Pg. 103, Vegetation # 3
 - Arguably the Fish and Wildlife section on Pg. 105 could be used.
 - Pg. 108, Vegetation
 - Pg. 109, second paragraph, last sentence
 - Pg. 110, Open Space Goals, #2-7
 - Pg. 110, Policies # 1
 - Pg. 111, Policies # 4, 7, and 8
 - Pg. 112, Policies # 15, 18, and 21
 - Pg. 113, Discussion #1
- **Squaw Valley, General Plan and Land use Ordinance**
 - Pg. 11-12, Vegetation
 - Pg. 13, Precipitation and Avalanche Analysis, 2nd to last paragraph
 - Pg. 16, Streams and Waterways, 1st paragraph

- Pg. 17-18, Visual Analysis The last sentence of Pg. 17 and the 1st two complete paragraphs on pg 18.
- Pg. 66-67, Section 118- Erosion Control
- Pg. 71-72, Section 132- Forest Management
- Pg. 77, Section 135.16-Signs Prohibited-#n
- Pg. 98-99, Section 250- Forest Recreation District
- Pg. 99-102, Section 260-Conservation Preserve Land Use District

- **Sheridan General Plan**
 - Pg. 20, Vegetation, 2nd paragraph, 2nd sentence

- **Sunset Industrial Area Plan**
 - Pg. vi, Habitat Types and Woodland Areas
 - Pg. 1-57, Land Development, Policy 1.H.5.
 - Pg. 3-4, Implementation Programs, Policy 3.B.9.
 - Pg. 4-2, Vegetative Resources
 - Possibly, Pg. 4-5 Habitat Conservation Plan
 - Pg. 4-5 thru 4-21, Goal 4.A

- **Auburn/Bowman Community Plan**
 - Pg. 8, Community Goals, # 14
 - Pg. 10, Planning Principles, # 2
 - Pg. 31, Open Space, # 1
 - Pg. 45, m. Open Space, and n. Riparian/Drainage
 - Pg. 47-48, (1) Bell Road Property
 - Pg. 59, Implementation, # e
 - Pg. 62, Goals #j, l
 - Pg. 62-64, Policies, General, (1), (2), (3), (8), (11), and (12)
 - Pg. 66, Residential, (25)
 - Pg. 67, Highway 49 Corridor, #2
 - Pg. 94, Policies, #c Environmental feasibility- large trees...
 - Pg. 121-124, Vegetation
 - Pg. 124, Fish and Wildlife, Goals #1, and Policies #1, and 4
 - Pg. 129, Open Space, Goals, a-c, and g
 - Pg. 130-132, Open Space, Policies, c, f, k, n, and u
 - Pg. 134, Hydrology, m
 - Pg. 135, Vegetation, s
 - Pg. 135, Fish and Wildlife, t
 - Pg. 162, Plan Proposals, c-last paragraph

- **Granite Bay Community Plan**
 - Pg. 3, Vegetation and Fish and Wildlife
 - Pg. 6, General Community Goals, # 4
 - Pg. 16-17, Goals, # 6, 10 and 13
 - Pg. 18, Policy #12
 - Pg. 19, Specific Policies for Intensity of Use, #2
 - Pg. 19-20, Specific Policies for Subdivision, # 1
 - Pg. 23, Specific Policies for Preservation /Conservation of Natural Resources, #2
 - Pg. 23, Implementation, #1

- Pg. 33, Community Design Element, Goals #9
 - Pg. 34-35, Policies # 8 and 11b, 11c
 - Pg. 38-40, Policies, # 3-6, 15, 18, 20, and 21
 - Pg. 43, Implementation, 1st paragraph
 - Pg. 65-66, Policies, # 3, #7
 - Pg. A-3 thru A-4, Landscaping, Specific Standards
 - Pg. A-8, Landscaping, Specific Standards
 - Pg. A-10, Landscaping #1
 - Pg. A-11, Landscaping #1
 - Pg. A-12, Landscaping #1
 - Pg. A15, Vegetation Removal/Landscaping
- **Martis Valley General Plan**
 - Pg. 4, Goals, # 4-6
 - Pg. 7, Forests and Other Vegetation
 - Pg. 14, Open Space, last paragraph continuing onto pg 15
 - Pg. 35-36, Forest
 - Pg. 47, Environmental Resource Policies, #1, 2 and 4
- **Meadow Vista Community Plan**
 - Pg. 10, Goal 1.B, Policy, 1.B.1
 - Pg. 14, Open Space, Habitat, and Wildlife, Resources
 - Pg. 15-16, Scenic Resources, Goals, 1.K.1, 1.K.3, 1.K.7, and 1.K.8
 - Pg. 16, Scenic Routes, Goal, 1.L.2
 - Pg. 17, Economic Development, Goal, 1.M.3.
 - Pg. 20, Open Space, 1st paragraph
 - Pg. 21, Riparian/Drainage
 - Pg. 26, I. Purpose, 1st paragraph
 - Pg. 27-26, II. Goals, Policies, and Implementation Programs, Goals, 2.A.4, and 2.B.2
 - Pg. 29, Policies, 2.G.4.
 - Pg. 31-32, E. Landscaping
 - Pg. 34, 2. Scenic Corridors
 - Pg. 43, Policy, 4.A.14
 - Pg. 62, Flood Protection, Goal 5.F.4b
 - Pg. 100-101, Goals and Policies, Vegetation
 - Pg. 102, Water Resources, Policies 9.B.3, 9.B.4c and e, 9.B.7 and 9.B.8
 - Pg. 103, Wetland and Riparian Areas, Policies 9.C.2 and 9.C.4
 - Pg. 104-105, Fish and Wildlife Habitat, Policies, 9.D.1e, and 9.D.8
 - Pg. 105-106, Open Space for the Preservation of Natural Resources, Policy, 9.E.1, 9.F.1 and 9.I.3
 - Pg. 109-110, Implementation Programs, Vegetation # 2, 6, and 7
 - Pg. 112, Fish and Wildlife, # 16e
 - Pg. 118, Discussion II, 1.Vegetation, # 1.1.2, 1.1.3, and 1.2
- **Horseshoe Bar/Penryn Community Plan**
 - Pg. 17, Goals, a, and c
 - Pg. 19, Policy, a
 - Pg. 23, Implementation
 - Pg. 27, c. and e.
 - Pg. 76, Additional factors which require consideration...bullet #6

- Pg. 88-89, Community Design Element, Goals, #2, 5 and 9
- Pg. 90- 93, Policies # 5, 15b, 15c, 27, and 28
- Pg. 125, Goals #1-3
- Pg. 125-126, Policies # 1, 6, 9, and 10
- Pg. 129-130, Oak Woodlands, and Riparian Communities
- Pg. 131-133, #1, 2, 6, 7
- Pg. 135, Discussion, last paragraph
- Pg. 140-141, Policies # c and j

- **Foresthill Community Plan**

- Pg. 2-1, bullet 2, 7,11,
- Pg. 3-41-42, Forest Backdrop
- Pg. 4-4 and 4-5, Vegetation, Policies, 4.A.1-3 thru –5, 4.A.1-8 thru –15.
- Pg. 4-5, Wetlands and Riparian Areas, Policy 4.A.2-4
- Pg. 4-12 and 4-13, Open Space, Policy 4.A.11-1, -2, and –7
- Pg. 4-13, Policy 4.A.12-3
- Pg. 4-17, Vegetation, Coniferous Forest, Montane Harwood, Chaparral, and Blue Oak Woodland.

Appendix B

Complete List of Habitats in Placer County as Identified by The California Wildlife Habitat Relationships System

Tree dominated habitats

Aspen
Blue Oak Woodland
Blue Oak-Foothill Pine
Closed-Cone Pine-Cypress
Eastside Pine
Eucalyptus
Jeffrey Pine
Juniper
Lodgepole Pine
Montane Hardwood
Montane Hardwood-Conifer
Montane Riparian
Ponderosa Pine
Red Fir
Sierran Mixed Conifer
Subalpine Conifer
Valley Foothill Riparian
Valley Oak Woodland
White Fir

Shrub dominated habitats

Alpine Dwarf-Shrub
Bitterbrush
Chamise-Redshank Chaparral
Low Sage
Mixed Chaparral
Montane Chaparral
Sagebrush

Herbaceous dominated habitats

Annual Grassland
Pasture
Perennial Grassland

Aquatic habitats

Fresh Emergent Wetland
Lacustrine
Riverine
Wet Meadow

Developed habitats

Cropland
Orchard-Vineyard
Urban

Appendix C

Photographs and Sample Leaf Images

Blue Oak



J. E.(Jed) and Bonnie McClellan © California Academy of Sciences



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Black Oak



© Br. Alfred Brousseau, Saint Mary's College



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Valley Oak

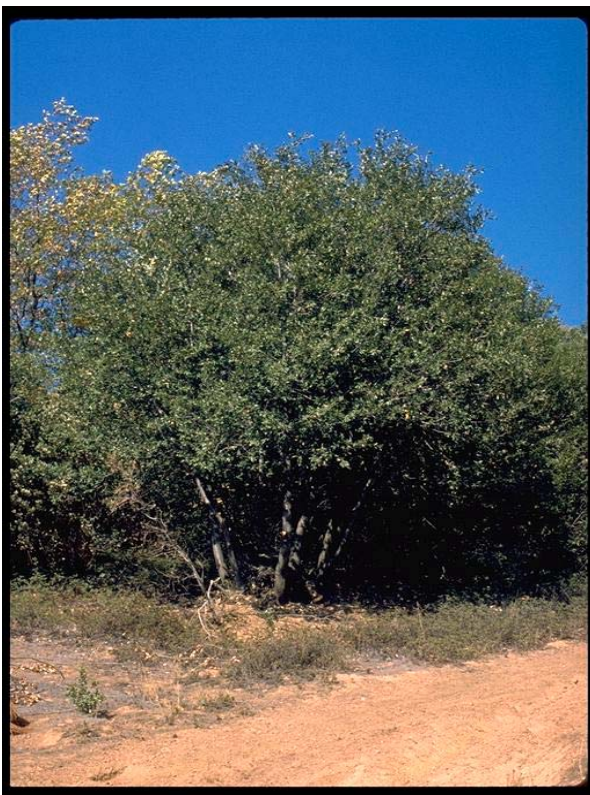


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University of California Museum of Paleontology

Interior Live Oak

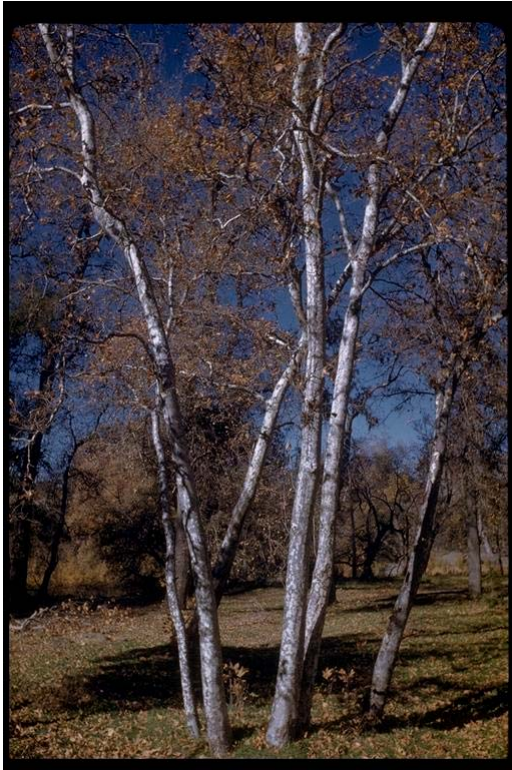


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California Sycamore



Charles Webber © California Academy of Sciences



Charles Webber © California Academy of Sciences

Black Walnut



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Robert Potts © California Academy of Sciences

Buckeye



Charles Webber © California Academy of Sciences



© 2001 Julie Kierstead Nelson

Fremont Cottonwood



© 2002 Charles E. Jones



Gerald and Buff Corsi © California Academy of Sciences

Willow Spp.



© Br. Alfred Brousseau, Saint Mary's College



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Oregon Ash

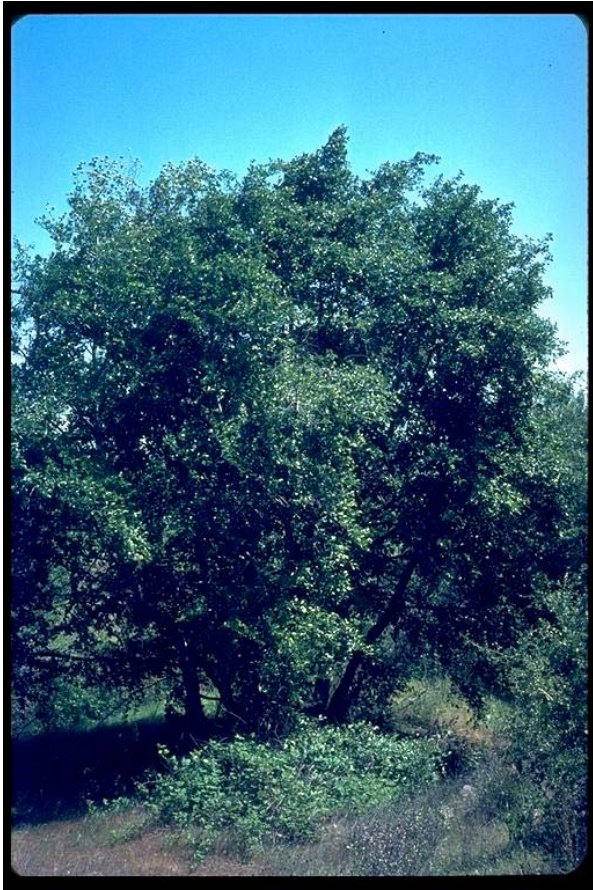


Charles Webber © California Academy of Sciences



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White Alder



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Beatrice F. Howitt © California Academy of Sciences

Ponderosa Pine



Charles Webber © California Academy of Sciences

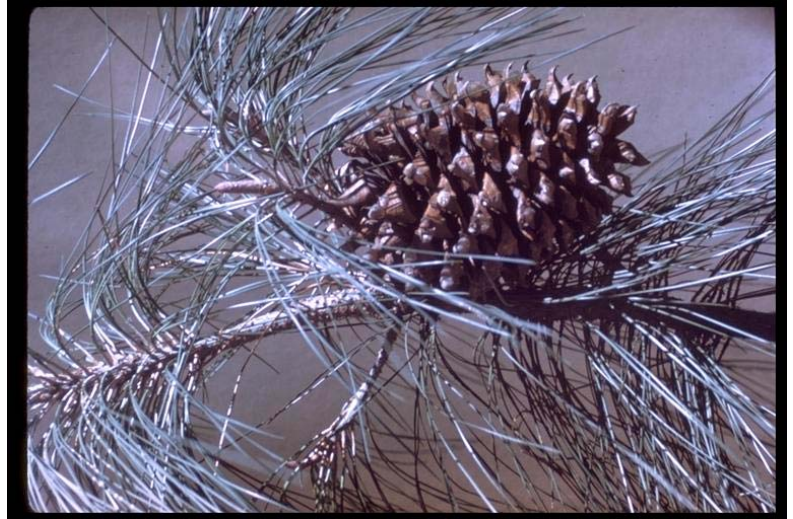


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Foothill Pine

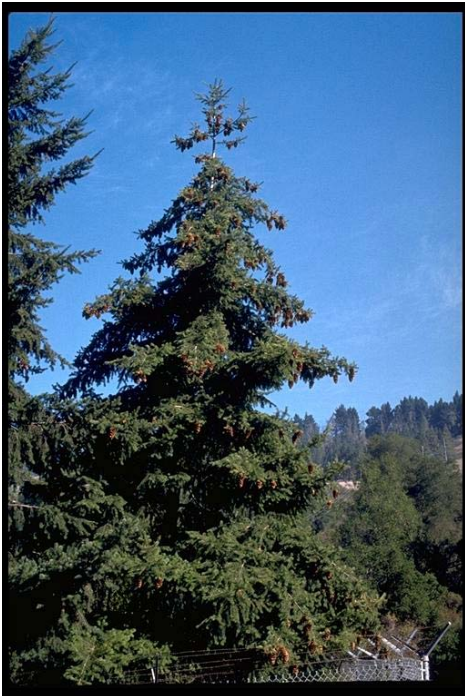


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Douglas Fir

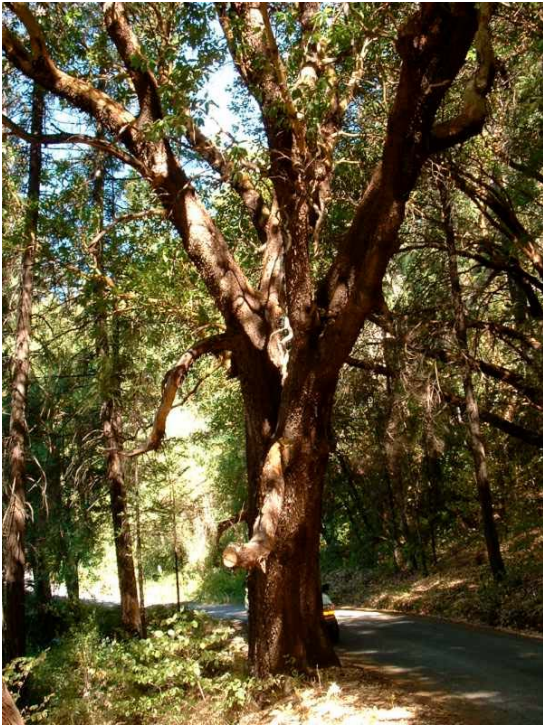


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Gerald and Buff Corsi © California Academy of Sciences

Pacific Madrone



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Jeffrey Pine

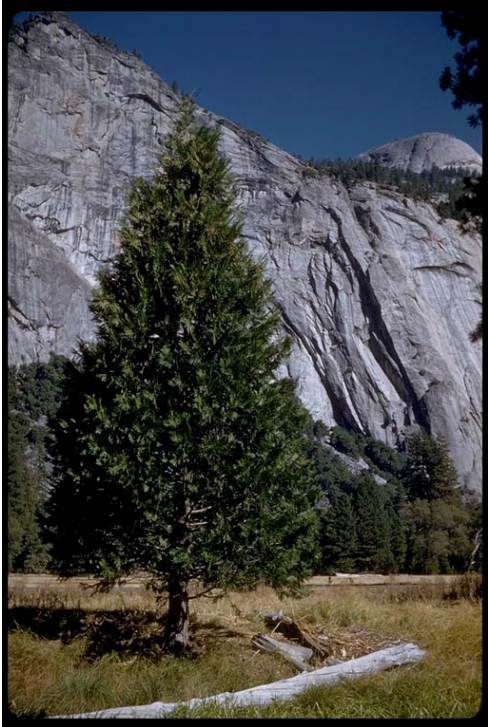


J. E.(Jed) and Bonnie McClellan © California Academy of Sciences



Gerald and Buff Corsi © California Academy of Sciences

Incense Cedar

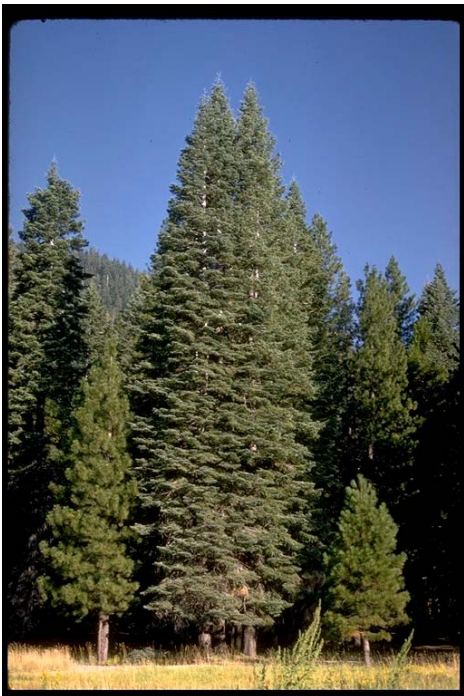


Neva Snell © California Academy of Sciences



Charles Webber © California Academy of Sciences

White Fir



J. E.(Jed) and Bonnie McClellan © 1999 California Academy of Sciences



Gerald and Buff Corsi © California Academy of Sciences

Red Fir



Charles Webber © California Academy of Sciences



Charles Webber © California Academy of Sciences

Lodgepole Pine



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Charles Webber © California Academy of Sciences

Western White Pine

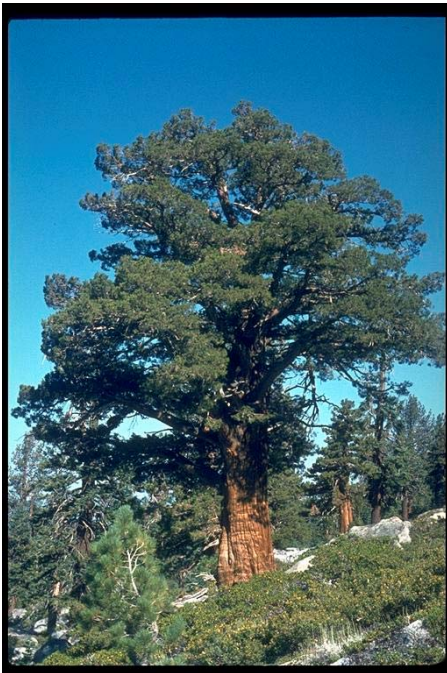


Neva Snell © California Academy of Sciences



Charles Webber © California Academy of Sciences

Western Juniper



Charles Webber © California Academy of Sciences

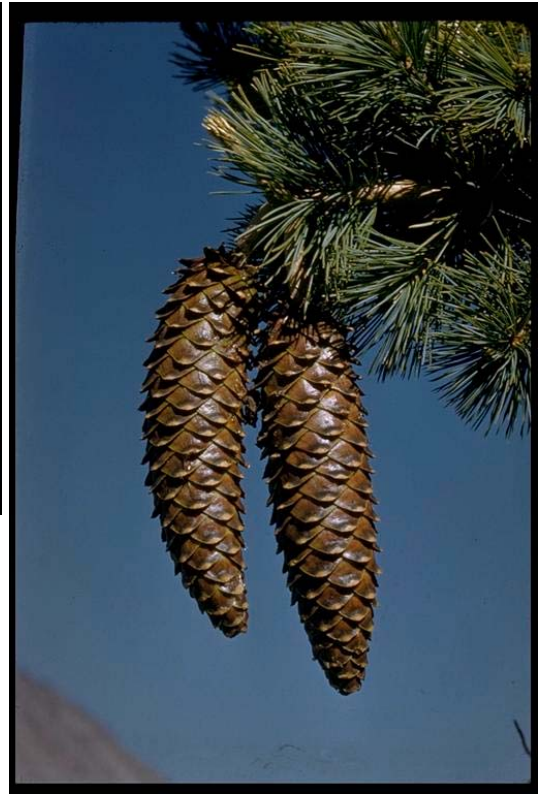


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Sugar Pine



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Charles Webber © California Academy of Sciences

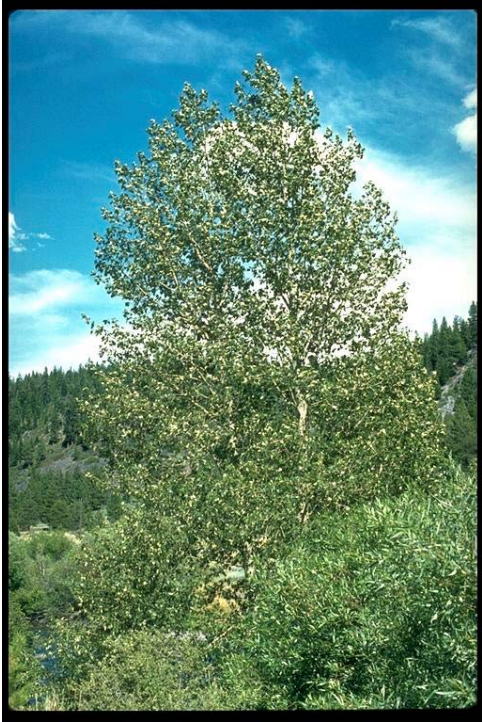
Quaking Aspen



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Black Cottonwood



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